Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Reassessment of Federal Communications Commission Radiofrequency Exposure Limits and Policies	)	**ET Docket No. 13-84**
	)	
Proposed Changes in the Commission's Rules Regarding Human Exposure to Radiofrequency Electromagnetic Fields	)	**ET Docket No. 03-137**
	)	

To the Commission:

Comments of Nickolaus E. Leggett, N3NL
Amateur Radio Extra Class Operator, Inventor, and Analyst

I am a certified electronics technician (ISCET and iNARTE) and an Extra Class amateur radio operator (call sign N3NL). I hold an FCC General Radiotelephone Operator License with a Ship Radar Endorsement. I am an inventor holding three U.S. Patents. My latest patent is a wireless bus for digital devices and computers (U.S. Patent # 6,771,935). I have a Master of Arts degree in Political Science from the Johns Hopkins University.

I am one of the original petitioners for the establishment of the Low Power FM (LPFM) radio broadcasting service (RM-9208 July 7, 1997 subsequently included in MM Docket 99-25). I am also one of the petitioners in the docket to establish a low power radio service on the AM broadcast band (RM-11287). I have filed a total of over 200 formal comments with the FCC over the years since the 1970s. I have filed comments with other Federal agencies as well including the USPTO, FAA, FERC, EPA, and the TSA.

I have written a reviewed article on the exposure to radiofrequency electromagnetic waves. Refer to Reference One.

My Comments

My comments discuss the impact of planned radiofrequency exposure limits on the amateur radio service (ARS). In addition, I discuss how negative impacts on amateur radio can be minimized by an improved administrative procedure.

Complexity of the Proposed Regulations

The proposed regulations will probably be more complex than the current regulations because the following emission characteristics will be included in the determination of the exposure:

- Transmitter output power (average value)
- Transmitter peak output power
- Radio frequency band
- Timing of operating periods
- Duration of operating periods
- Duty cycle during operating periods
- Antenna gain
- Antenna distance from exposed area(s)

A relatively involved mathematical calculation is required to determine the exposure based on these factors. This means that a significant amount of analytical work is required to determine if one's amateur radio station is in compliance with the rules.

Potential Negative Impacts

These complex rules can have the following negative impacts on amateur radio:

1. Inhibition of the free-wheeling experimental nature of amateur radio.
2. Motivation of home owner associations and condominium associations to establish increased restrictions on amateur radio operation and antennas.
3. Increased concern by neighbors about exposure to radio waves.
4. Increased litigation about amateur radio emissions and antennas. (This litigation would require participation by expensive radio engineers.)
5. Deterrence of would-be new amateur radio operators from participating in amateur radio.
6. Increased questions of safety of indoor transmitting antennas. (These antennas are often installed to avoid home owner association restrictions on outside antennas.)
7. Establishment of de-facto very low amateur radio power limits on many amateur radio frequency bands.
8. Increased hassles from notification standards.
9. Great uncertainty about mobile and portable operation.
10. Encouragement of the development of a society that is overly concerned with "safety" and "health".

All of these impacts could negatively impact amateur radio and decrease the numbers of people participating in amateur radio.

Use of an Authoritative Computer Model of RF Exposure

Many of the negative impacts listed above can be minimized by the establishment of an official authoritative computer model of radiofrequency exposure. This model would be hosted by the Commission and accessed by the public over the Internet.

In the case of fixed site amateur radio stations, the amateur radio operator is prompted for inputs about his station and the computer model informs the operator if his station is in compliance with the rules, or if a more detailed evaluation is necessary. If a more detailed evaluation is needed, the program then prompts the operator for all of the inputs needed for the evaluation. The evaluation output tells the operator what station changes are needed to move into compliance with the regulations.

In the case of mobile and/or portable operation, the amateur radio operator inputs data about his transmitter or transceiver, and the computer model outputs problem situations that can occur. For example, the computer model may indicate that being closer to people than a given distance is a problem, or that people sitting in the back seat of your convertible can be over exposed to radio frequency waves.

Additional Written Information

The Commission should also provide written text scenarios that describe generally safe situations that amateur radio operators can use for guidance. In addition, the Commission engineering staff can provide a table listing generally safe power output levels for each allocated amateur radio band. On some bands this output power level may be only a few Watts, while on other bands the level may be quite high. This table would provide easy play-it-safe compliance with the new radiofrequency exposure rules.

Conventional Written Information

The Commission should also provide more conventional compliance information in the form of equations and data tables for use by radio engineers and by technically inclined amateur radio operators. This information would be useful for persons, such as me, who wish to establish their own exposure models for comparison with the Commission's computer model of radio frequency exposure.

Recommended Actions

The Commission should work hard to establish this proposed set of compliance tools for amateur radio operators. In addition this type of online computer model of exposure could be useful for other radio services as well. The model would make sure that all of the radio operators were on the same page in regards to compliance without having an overload of engineering calculations and assumptions.

Volunteer

I have experience in the development of mathematical models. Refer to Reference Two. I am willing to participate on a team established by the Commission and/or others such as the ARRL to develop the authoritative computer model of radio frequency exposure. My participation would be as a volunteer analyst.

Respectfully submitted,

Nickolaus E. Leggett, N3NL
Amateur Radio Extra Class Operator
1432 Northgate Square, #2A
Reston, VA 20190-3748

(703) 709-0752
leggett3@gmail.com

April 8, 2013

Reference One: Nickolaus E. Leggett, N3NL, "How Safe is Your Ham Shack", QST, June 1978, American Radio Relay League, Newington, CT., pages 11-13 (Note: This article is useful for people who wish to learn about the radio frequency exposure topic.)

Reference Two: One of my simpler computer models is reported in the article -

Nickolaus E. Leggett, N3NL, "The Morphological Table – An Invention Generator, QEX, December 1987, American Radio Relay League, Newington, CT, pages 12 & 13

Appendix A – My Patents and Document References

Some of my document references are listed below:

United States Patent 6,771,935, Wireless Bus August 3, 2004
United States Patent 3,280,929 Ground-Effect Machine October 25, 1966
United States Patent 3,280,930 Ground-Effect Vehicle October 25, 1966

"Demonstration and Development of Amateur Radio Applications of Natural Vacuum Electronics"; Nickolaus E. Leggett, N3NL - 22nd AMSAT Space Symposium and Annual Meeting October 8-10, 2004 in Arlington, Virginia

"A 'Lighthouse' Protocol for Random Microwave Contacts", Nickolaus E. Leggett, N3NL, QEX The Experimenter's Exchange – Technical Notes July/August 2004 – American Radio Relay League, Newington, CT.

Wireless bus invention – U.S. Patent # **6,771,935**

Abstract

In order to avoid mechanical assembly problems and transmission of undesired electrical currents among circuit cards or boards in a telecommunications switch or similar digital device, a conventional hard-wired midplane bus is replaced by a wireless bus. The wireless bus includes a radio frequency or light wave transceiver on each card. Antennas on respective cards can either

be oriented within direct line-of-sight of each other, or can project into a waveguide which directs the transmitted signals past all the other antennas. For example, the waveguide may be a metal enclosure which surrounds all the cards. Alternatively, respective aligned apertures in the cards can define a continuous transmission path. A data rate exceeding 1 megabit per second and a transmission power on the order of 1 milliWatt are preferred, since the bus is intended for use within a single switch housing. Radio frequencies in the middle to high microwave range or light frequencies in the visible range are preferred for providing sufficient bandwidth and to facilitate servicing.